

EXPERT OPINION

A potential use for injectable oxygen microparticles in anaphylaxis

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We welcome Professor Sheikh's suggestions [1] for future work on treatments for anaphylaxis and would like to propose injectable oxygen microparticles as a new avenue for research.

A recent epidemiological study from Rochester, USA suggested 33.2% of cases of anaphylaxis were triggered by food [2]. Moreover, between 1999 and 2006, 48 fatal anaphylactic reactions due to food were reported in the UK [3]. Most of these deaths were due to respiratory arrest (as opposed to cardiovascular collapse and cardiac arrest).

Respiratory arrest in anaphylaxis is presumed to be secondary to laryngobronchial spasm and oedema, which prevents oxygen delivery to alveoli. In this scenario, case series data suggests that modal time to arrest after ingestion of food (allergen) is 30 – 35 min [4].

Current emergency management centres on administration of adrenaline (typically intramuscular), anti-histamine and glucocorticoids. Adrenaline has a rapid response, inducing alpha-1 adrenoreceptor-mediated peripheral vasoconstriction and some beta-2 adrenoreceptor-mediated bronchodilation. Repeated doses at up to 5 min intervals are suggested by the UK Resuscitation Council guidelines for refractory anaphylaxis [5]. Chlorphenamine is thought to act against histamine-mediated bronchoconstriction in respiratory arrest [6] and hydrocortisone to mediate a more prolonged anti-inflammatory action [7].

Given the time course of respiratory arrests in anaphylaxis, it would seem appropriate to supplement arterial oxygen tension via extrapulmonary methods.

Injectable oxygen microparticles have recently been described as a novel potential method for the rapid oxygenation of blood [8]. Described as 'self-assembling, lipid-based microparticles encapsulating a core of pure oxygen gas', they have been designed for injection into a central vein. In an *in vivo* animal model, rabbits who underwent total tracheal occlusion and who received intravenous oxygen microparticles were shown to have reduced rates of cardiac arrest compared with controls. There has been some progress towards mass production [9] but safety and efficacy in humans is untested. While injection of oxygen microparticles involves the introduction of a fluid load; we believe the net effect of this will be beneficial given circulatory collapse in anaphylaxis.

The inventors of oxygen microparticles have suggested a number of uses for this technology, including improved wound healing and hypoxaemic cardiac arrest [8]. We propose research into the use of oxygen microparticles as an adjunct to current therapy for anaphylaxis, especially for reactions to food, or where ventilatory support is suboptimal due to bronchospasm and laryngospasm.

Declaration of interest

The authors state no conflict of interest and have received no payment in preparation of this manuscript.

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